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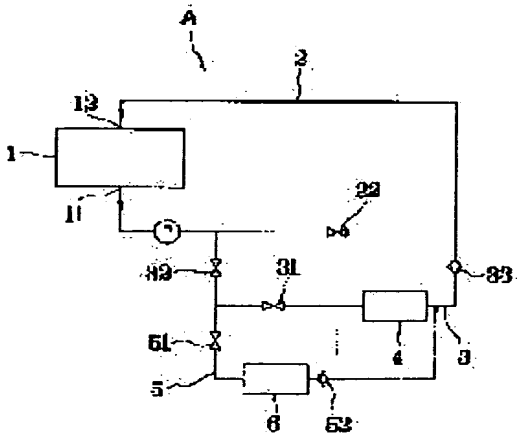
(54) WATER QUALITY-KEEPING APPARATUS

(57)Abstract:
PROBLEM TO BE SOLVED: To prevent deterioration of quality of water by circulating stored water by circulating stored water in a water storage part, connecting a branched flow line for water quality inspection through a flow rate adjusting part in a water circulation line, and installing a water quality inspecting means in the branched flow line.
SOLUTION: In the case this apparatus is employed for a water distribution system A, tap water is stored in a tank 1 and a water outlet 11 and a water inlet 12 of the tank is made to communicate and connected with each other through a circulation pump P by a stored water circulation flow line 2 to circulate tap water in the tank 1. A branched flow line 3 is connected in parallel to the circulation flow line 2 to throttle the flow rate in the flow line 3 than that in the circulation flow line 2 by a flow rate regulating valve 31 installed in the middle of the flow line 3 and at the same time, an electrolysis apparatus 4 is installed in the branched flow line 3 to turn back the water which is passed through the electrolysis apparatus 4 to the circulation flow line 2. Moreover, a branched flow route 5 for water quality inspection is connected in parallel to the branched flow line 3 and the flow rate is throttled by a flow rate regulating valve 51 more than that in the branched flow line 3 and at the same time a remaining chlorine concentration meter 6 is installed. The electrolysis apparatus 4 is operated based on the measurement result of the remaining chlorine concentration meter to keep the water quality.



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CLAIMS

[Claim(s)]
[Claim 1] It is a circulating pump (P) about the reservoir water in the storage-of-water section (1) and (10). Prepared reservoir water cycle passage (2) Mind and it constitutes possible [circulation]. This reservoir water cycle passage (2) Branching passage for water examinations which extracted the flow rate through the flow control section (51) (5) While connecting with said storage-of-water section (1) and (10) possible [reflux], it is the branching passage for the said water examinations (5). Water-examination means (6) Water quality retainer characterized by preparing.
[Claim 2] flood opening (11) and suicide-by-drowning opening (12) of the storage-of-water section (1) and (10) — circulating pump (P) Reservoir water cycle passage (2) which minded and carried out free passage connection This reservoir water cycle passage (2) It connects with juxtaposition, reflux is made possible, the 1st flow control section (31) is minded, and it is said reservoir water cycle passage (2). While extracting a flow rate halfway — water quality maintenance means (4) Interposed branching passage (3) This branching passage (3) from — it branches — making — said storage-of-water section (1) — Reflux is made possible (10), the 2nd flow control section (51) is minded, and it is said branching passage (3). While extracting a flow rate, it is a water-examination means (6) to halfway. Interposed branching passage for water examinations (5) Water quality retainer characterized by providing.
[Claim 3] Said branching passage for water examinations (5) Said branching passage (3) Water quality retainer according to claim 2 characterized by connecting with juxtaposition.
[Claim 4] Said branching passage for water examinations (5) While carrying out free passage connection of the termination (50) the storage-of-water section (1) and (10), it is a water-examination means (6). Water quality retainer according to claim 2 characterized by having arranged above the storage-of-water section (1) and (10).
[Claim 5] Said circulating pump (P) Water quality maintenance means (4) And water-examination means (6) It connects electrically and is this water-examination means (6). It is based on a detection result and is a circulating pump (P). And water quality maintenance means (4) Control section to operate (9) Water quality retainer according to claim 2 to 4 characterized by providing.
[Claim 6] Said circulating pump (P) Water quality retainer according to claim 1 to 5 characterized by controlling to carry out intermittent operation.
[Claim 7] Said water quality maintenance means (4) It considers as the electrolytic device which electrolyzes water and is made to generate a hypochlorous acid and a hypochlorite, and is a water-examination means (6). Water quality retainer according to claim 2 to 6 characterized by considering as a residual chlorine concentration meter.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the water quality retainer which enabled maintenance of the water quality of the domestic water stored in the tank etc., the water of a pool, the water in a cooling tower, or the water of a 24-hour bath system in the good condition in detail about the water quality retainer.
[0002]
[Description of the Prior Art] For example, when set to 0.1 ppm or less, he throws in chlorine as a disinfectant and was trying to give the disinfection force, when residual chlorine concentration is supervised and the value is less than a predetermined value conventionally on the occasion of use of the domestic water once stored in the tank etc. Moreover, also in the pool etc., chlorine is used as a disinfectant.
[0003] Although the residual chlorine concentration meter was used in order to detect residual chlorine concentration, the pump rise of the object water which it lets pass to this concentration meter was usually carried out with the storage pump for every predetermined time from said tank or the pool, it has obtained, and after concentration detection was drained out of the system.
[0004]
[Problem(s) to be Solved by the Invention] However, since it becomes stagnation water only by storing water and is easy to become ****, as described above, in order to keep the condition of right water as much as possible, it is possible to arrange a circulating pump and to circulate water.
[0005] On the other hand, since there were too many flow rates, or the membrane for concentration detection was damaged when the rate of flow was too quick, and the above-mentioned residual chlorine concentration meter caused failure, he could not arrange directly all over the circulating flow way, but prepared the storage pump after all, and was doing the pump rise of the water for concentration detection.
[0006] However, now, two pumps of a storage pump and a circulating pump will be needed, and it will be disadvantageous in cost.
[0007] And we are anxious about the problem of the cost of this disinfectant, and the secondary disaster generated by the lack of disinfection, or the excess of disinfection the top where the activity which supplies a disinfectant when the disinfection force declines is troublesome.
[0008] Thus, it was difficult to maintain the water quality of the water stored at the long period of time good by low cost, and when it was domestic water in which especially this can carry out a drink, it was still more so.
[0009] This invention aims at offering the water quality retainer which can solve the above-mentioned technical problem.
[0010]
[A means to solve invention] In order to solve the above-mentioned technical problem, the reservoir water of storage-of-water circles was constituted from this invention according to claim 1 possible [circulation] through the reservoir water cycle passage in which the circulating pump was formed, and while connecting to said storage-of-water section the branching passage for water examinations which extracted the flow rate to this reservoir water cycle passage through the flow control section possible [reflux], the water-examination means was formed in the branching passage for the said water examinations.
[0011] Moreover, the reservoir water cycle passage which carried out free passage connection of flood opening and suicide-by-drowning opening of the storage-of-water section through the circulating pump in this invention according to claim 2, While connecting with juxtaposition in this reservoir water cycle passage, making reflux possible and extracting a flow rate rather than said reservoir water cycle passage through the 1st flow control section It considered as the configuration possessing the branching passage which interposed the water quality maintenance means in halfway, and the branching passage for water examinations which interposed the water-examination means in halfway while making it branch from this branching passage, making reflux possible at said storage-of-water section and extracting a flow rate rather than said branching passage through the 2nd flow control section.
[0012] Moreover, in this invention according to claim 3, said branching passage for water examinations was connected to juxtaposition in said branching passage.
[0013] Moreover, in this invention according to claim 4, while carrying out free passage connection of the termination of said branching passage for water examinations at the storage-of-water section, the water-examination means has been arranged above the storage-of-water section.

[0014] Moreover, in this invention according to claim 5, it connected with said circulating pump, the water quality maintenance means, and the water-examination means electrically, and considered as the configuration possessing the control section which operates a circulating pump and a water quality maintenance means based on the detection result of this water-examination means.
[0015] Moreover, it controlled by this invention according to claim 6 to carry out intermittent operation of said circulating pump.
[0016] Moreover, in this invention according to claim 7, it considered as the electrolytic device which electrolyzes water for said water quality maintenance means, and is made to generate a hypochlorous acid and a hypochlorite, and the water-examination means was used as the residual chlorine concentration meter.
[0017]
[Embodiment of the Invention] This invention constitutes the reservoir water of storage-of-water circles possible [circulation] through the reservoir water cycle passage in which the circulating pump was formed, and it forms a water-examination means in the branching passage for the said water examinations while it connects to said storage-of-water section the branching passage for water examinations which extracted the flow rate to this reservoir water cycle passage through the flow control section possible [reflux].
[0018] As a water-examination means, the residual chlorine concentration meter which can detect the existence of the disinfection force of water by the level of chlorine is used suitably. Moreover, as the flow control section, a flow control valve can be used suitably.
[0019] That is, preventing circulating reservoir water, such as domestic water, water of a pool, water of a cooling tower, and organ bath water of a 24-hour bath system, on a circulating flow way, and carrying out bad hydration, a water-examination means obtains a flow rate proper for functioning, and is made to inspect water quality correctly.
[0020] Thus, while circulating the reservoir water of storage-of-water circles and preventing bad hydration as much as possible, if water quality is correctly supervised with a water-examination means to coincidence and water quality is less than a reference value, a measure will be taken for a water quality improvement, and maintenance of water quality will be aimed at.
[0021] In addition, as a water quality maintenance means, an electrolytic device, an ozone generator, a ultraviolet water sterilizer, etc. can be considered, and the following configurations can be considered preferably [also having these in a system].
[0022] Namely, while carrying out free passage connection of flood opening and suicide-by-drowning opening of the storage-of-water section through the reservoir water cycle passage which formed the circulating pump in halfway and extracting a flow rate to this reservoir water cycle passage rather than said reservoir water cycle passage through the 1st flow control section While connecting to juxtaposition the branching passage which interposed the water quality maintenance means in halfway, making reflux possible and extracting a flow rate from this branching passage rather than said branching passage through the 2nd flow control section further The branching passage for water examinations which interposed the water-examination means in halfway is branched, and reflux is made possible at said storage-of-water section.
[0023] Said branching passage for water examinations which interposed the water-examination means can be considered as the configuration which arranges a water-examination means above the storage-of-water section while it connects with juxtaposition in said branching passage or it carries out free passage connection of the termination of the branching passage for the said water examinations at the storage-of-water section.
[0024] If the value which shows deterioration of water quality with a water-examination means is detected even if it is which configuration, improvement of water can be attained with a water quality maintenance means, circulating reservoir water.
[0025] Furthermore, it is desirable to connect with said circulating pump, a water quality maintenance means, and a water-examination means electrically, and to provide the control section which operates a circulating pump and a water quality maintenance means based on the detection result of this water-examination means.
[0026] By having this control section, actuation for inspection of water quality and maintenance can be performed automatically and continuously.
[0027] Moreover, said circulating pump is enough for inspection and water quality maintenance of water quality, even if it carries out intermittent operation, without making it always operate, and it does the power saving effectiveness so.
[0028] Furthermore, if it considers as the electrolytic device which electrolyzes water for said water quality maintenance means, and is made to generate a hypochlorous acid and a hypochlorite and a water-examination means is used as a residual chlorine concentration meter, when the water of the storage-of-water section is domestic water which stored tap water, it will become effective especially.
[0029] Namely, storing in the tank the tap water which is domestic water, circulating this always or intermittently, and preventing aggravation of water quality An electrolytic device will be operated, if residual chlorine concentration is measured for every fixed time amount and this falls to concentration unsuitable as domestic water. The chloride contained in reservoir Mizuuchi is electrolyzed, the hypochlorous acid (HClO) and hypochlorite (ClO^-) which show a germicidal action are generated, this is made to flow back to reservoir underwater, the disinfection force is given to reservoir water, and a condition suitable as domestic water is held over a long period of time.
[0030] Thus, the emergency of disaster, such as an earthquake, can be equipped with domestic water over a long period of time that a reservoir is possible, then by laying the storage-of-water section underground for example, near the emergency shelter in installation or underground.

[0031] As a residual chlorine concentration meter, are good at the well-known concentration meter possessing a film-like electrode generally used. In addition, this concentration meter Since it is necessary to measure the hypochlorous acid and hypochlorite in water content per unit volume of concrete, Although, and the amount of the water which has composition which is immersed in the water which piled up, or is immersed into a loose little stream and measures a film-like electrode, and serves as a candidate for measurement causes failure of about [that exact concentration detection cannot be performed] or an instrument when flow is early In this invention, without producing such fault, since it has prepared in the branching passage which can obtain a proper flow rate as described above, measuring correctly is possible and the water which finished measurement can be returned to the storage-of-water section.
[0032] Therefore, the residual chlorine concentration meter of this common knowledge is good to consider as the configuration arranged above the storage-of-water section, as mentioned above, and the water which finished inspection can be returned to the storage-of-water section by natural fall.
[0033] moreover, the thing of the following configurations of a residual chlorine concentration meter — ** — if it carries out, it will become applicable even if it is the thing of a configuration of having connected said branching passage for water examinations to juxtaposition in said branching passage, and having made reflux possible to the storage-of-water section. Therefore, it is convenient for construction of the water supply system which can set up a residual chlorine concentration meter's installation part freely, and supplies domestic water.
[0034] While forming object water passage with this residual chlorine concentration meter's configuration by the straight shell which can connect with the halfway of the branching passage for water examinations It is made to branch upwards from the halfway of the water passage for said, and the electrode hold sections are formed successively, concentration meter casing is constituted so that the abbreviation for T characters may be made on the whole, and the object water which was made to face [object water passage] the film-like electrode held in said electrode hold section, and was extracted to the small flow rate, and contact are enabled.
[0035] By the way, the branching passage for water reducing for passing by the optimal flow rate to the branching passage for water examinations between reservoir water cycle passage and branching passage is also further connectable with juxtaposition. Two or more steps of branching passage for the said water reducing may be prepared not only in 1 passage. That is, it is set up so that the optimal amount of water introduced into a water-examination means can be obtained reasonable.
[0036] Moreover, although it is desirable to use the aforementioned flow control valve which can adjust a flow rate suitably as a flow control means, the path of the piping itself which forms passage, such as branching passage, and branching passage for water examinations or the above mentioned branching passage for water reducing, can be extracted, and it can also consider as a flow control means.
[0037] By this invention, as explained above, while circulating reservoir water only by circulating-pump P, and though it is low cost since the optimal amount of water for detection of residual chlorine concentration can be led to a concentration meter, exact concentration detection can be performed, a water quality maintenance means can be operated based on the detection result, and water can be stored in the condition with a good rear spring supporter at a long period of time.
[0038]
[Example]
(The 1st example) Based on an attached drawing, the 1st example of this invention is explained hereafter. This example explains the water quality retainer as water-supply-system A which supplies domestic water.
[0039] Drawing 1 is the typical explanatory view of water-supply-system A.
[0040] 1 is a tank as the storage-of-water section, and is storing tap water as domestic water.
[0041] 2 is reservoir water cycle passage, is carrying out free passage connection through circulating-pump P, and is enabling circulation of the tap water in a tank 1 of the flood opening 11 and the suicide-by-drowning opening 12 of a tank 1. 22 is a closing motion valve interposed in this reservoir water cycle passage 2.
[0042] 3 is branching passage, and it has extracted the flow rate rather than said reservoir water cycle passage 2 through the 1st flow control valve 31 as the 1st flow control section while connecting with juxtaposition in the reservoir water cycle passage 2. And the electrolytic device 4 as a water quality maintenance means is interposed in halfway, and the reflux of the water which passed this electrolytic device 4 to said reservoir water cycle passage 2 is enabled.
[0043] That is, the branching passage 3 branches from the downstream of circulating-pump P of the reservoir water cycle passage 2, carries out free passage connection with an electrolytic device 4 through the 1st flow control valve 31, and joins the reservoir water cycle passage 2 through the check valve 33 prepared in the downstream of this electrolytic device 4. 32 is the closing motion valve prepared in the upstream of said 1st flow control valve 31.
[0044] 5 is the branching passage for water examinations, through the 2nd flow control valve 51 as the 2nd flow control section, extracts a flow rate further rather than said branching passage 3, and is interposing in halfway the residual chlorine concentration meter 6 which consists of a configuration mentioned later as a water-examination means while connecting with juxtaposition in the branching passage 3. 52 is the check valve prepared in the residual chlorine concentration meter's 6 downstream.
[0045] That is, the branching passage 5 for water examinations branches from between the 1st flow control valve 31 of the branching passage 3, and the closing motion valves 32, carries out free passage connection with the residual chlorine concentration meter 6 through the 2nd flow control valve 51, and joins halfway through a check valve 52 from this residual chlorine concentration meter 6 at the upstream of said electrolytic device 4 further. In addition,

the termination of the branching passage 5 for the said water examinations may be made to join the downstream of an electrolytic device 4, as the alternate long and short dash line of drawing 1 shows.
[0046] The configuration of the residual chlorine concentration meter 6 concerning this example is as follows.
[0047] As shown in drawing 2 , while forming the object water passage 61 with a straight communication trunk object connectable with the halfway of the branching passage 5 for water examinations Make it branch upwards from the halfway of the water passage 61 for said, and the tubing-like electrode hold sections 62 are formed successively. The concentration meter casing 60 is constituted so that the abbreviation for T characters may be made on the whole, and the object water which was made to face [the object water passage 61] the film-like sensor electrode 63 held in said electrode hold section 62, and was extracted to the small flow rate, and contact are enabled. 64 are a signal line to which packing and 65 connect a concentration meter control section to, and 66 connects this concentration meter control section 65 and said sensor electrode 63 among drawing 2 .
[0048] Circulating the tap water in a tank 1 by one circulating-pump P in the reservoir water cycle passage 2, preventing stagnation of water, and preventing bad hydration by having considered the residual chlorine concentration meter 6 as this configuration While making the tap water which opened the closing motion valve 32 of the branching passage 3, drove the 1st flow control valve 31 of this branching passage 3, and the 2nd flow control valve 51 of the branching passage 5 for water examinations suitably, and was made more nearly little than the reservoir water cycle passage 2 shunt toward the branching passage 3 In addition, flow control to which the tap water which extracted the flow rate further and was made little is made to shunt toward the branching passage 5 for water examinations can be performed, and residual chlorine concentration can be measured correctly.
[0049] Thus, in this example, the tap water of the optimum dose corresponding to the residual chlorine concentration meter 6 can be obtained in one circulation path, by measuring exact residual chlorine concentration, an electrolytic device 4 can be operated based on the result, and maintenance of water quality can be aimed at.
[0050] Namely, since the disinfection force of tap water is insufficient and it is judged that it is unsuitable as domestic water when the value detected with the residual chlorine concentration meter 6 is lower than 0.1 ppm Electrolyze the chlorine compound which drives an electrolytic device 4 and is contained in tap water, generate a hypochlorous acid (HClO) and a hypochlorite (ClO^-), this is made to flow back in a tank 1 through the reservoir water cycle passage 2, and the disinfection force is given to tap water. In addition, for this electrolytic action, residual chlorine concentration is 0.15 ppm. It shall continue until it takes the above value.
[0051] Moreover, since the optimal amount of water for detection of residual chlorine concentration can be led to a concentration meter, becoming detectable [residual chlorine concentration] and circulating reservoir water only by circulating-pump P without arranging a storage pump etc. separately other than circulating-pump P, water-supply-system A of domestic water can be built by low cost, and the good condition can be maintained for domestic water over a long period of time.
[0052] Furthermore, in this example, since the residual chlorine concentration meter's 6 arrangement location can be set up freely, when building water-supply-system A, it is suitable.
[0053] (The 2nd example) Next, the 2nd example of this invention is explained, referring to drawing 3 . Here, the water quality retainer is explained as water-supply-system B.
[0054] Drawing 3 is the typical explanatory view of water-supply-system B concerning the 2nd example.
[0055] It is to differ from a previous example by this example to have arranged residual chlorine concentration meter 6' used as a water-examination means above a tank 1 while carrying out free passage connection of the termination 50 of said branching passage 5 for water examinations at a tank 1.
[0056] Here, the thing of the configuration of the common knowledge generally conventionally used in residual chlorine concentration meter 6' is used.
[0057] Reservoir section 6a which connected to the pars basilaris ossis occipitalis inflow way 5' which carried out free passage connection with storage pump P' as this residual chlorine concentration meter 6' was shown in drawing 4 , It consists of measurement section 6b which carried out free passage connection through the communicating tube 67 of this reservoir section 6a and a minor diameter, and is exhaust-port 68a to a lower limit in reservoir section 6a. The formed overflow pipe 68 is formed and free passage connection of the halfway of this overflow pipe 68 and said measurement section 6b is carried out further on the reflux way 69. 6a' It is a hole for atmospheric-air disconnection.
[0058] Namely, although a pump rise is carried out, it flows from the lower part of reservoir section 6a and fall discharge is carried out by self-weight out of a system from an overflow pipe 68, the water for measurement With the small head between overflow pipe 68 upper limit, a part has a flow rate extracted, and is slowed down through said communicating tube 67, and it flows in measurement section 6b, and though it is full in this measurement section 6b, it will be gradually flowed back and discharged by the overflow pipe 68 from the reflux way 69. Therefore, since most water for measurement flows back from an overflow pipe 68 and it flows by the low-speed style extremely in measurement section 6b, the water for measurement will be in the condition of having carried out abbreviation stagnation.
[0059] In measurement section 6b, it is signal-line 66' to residual salt concentration meter control-section 65'. It minds, receipt arrangement of sensor electrode 63' of the shape of connected film is carried out, and it is this electrode 63'. Residual chlorine concentration is made measurable by contacting the water for measurement.
[0060] In this way, there is much amount of water of the water for measurement, and general residual chlorine concentration meter 6' is sensor electrode 63' of the shape of about [that concentration detection exact when flow is quick cannot be performed], an instrument, especially film. It becomes the cause of failure.

[0061] Then, arrange above-mentioned residual chlorine concentration meter 6' above a tank 1, make it branch further from the branching passage 3, and he makes the halfway of the branching passage 5 for water examinations which extracted the flow rate further carry out free passage connection of the tip of said inflow way 5', and is trying to make a tank 1 overlook the exhaust port 68 of the lower limit of an overflow pipe 68 in this example. That is, termination 50 of the branching passage 5 for water examinations is considered as the configuration which carried out direct free passage connection at the storage-of-water section 1.
[0062] Therefore, also in this example using conventional residual chlorine concentration meter 6', the proper flow rate and rate of flow of the water for measurement could be acquired, the fault residual chlorine concentration meter 6' breaks down was canceled, and measurement of exact residual chlorine concentration was attained. And the water which finished measurement can be returned to a tank 1 by natural fall.
[0063] Thus, in water-supply-system B concerning this example, it has the advantage which can use a commercial thing as residual chlorine concentration meter 6'. Moreover, it is not necessary to form a check valve 52 like the 1st example in the downstream of residual chlorine concentration meter 6'.
[0064] In addition, since other configurations are the same as that of the 1st example, explanation here is omitted.
[0065] (The 3rd example) Next, the 3rd example of this invention is explained, referring to drawing 5 - drawing 7 .
[0066] the emergency watersupply [A / which explained this example in the 1st example / water-supply-system] system C in the cases, such as an earthquake disaster, -- applying -- a fundamental configuration -- the 1st example and abbreviation -- it is the same. Drawing 5 is the explanatory view of this emergency watersupply system C, and drawing 6 is this mimetic diagram.
[0067] In drawing 5 , 7 is the park specified as the emergency shelter by the local self-governing body etc., and is laying the emergency watersupply system C concerning this example underground in this park 7. And when a waterworks is cut off according to an earthquake disaster etc., supply of domestic water is temporarily enabled at disaster victims from the flush tank 10 used as the storage-of-water section of the emergency watersupply system C. In addition, capacity of a flush tank 10 is made into 50 cubic meters in this example, and it is the flow rate of the reservoir water cycle passage 2 Per minute 200 It is set as a liter.
[0068] Moreover, the flood opening 11 and the suicide-by-drowning opening 12 of a flush tank 10 are provided near the pars basilaris ossis occipitalis so that the stirring effectiveness in a flush tank 10 may be heightened (refer to drawing 6).
[0069] 8 is the processing room which adjoined said flush tank 10 and was prepared in the earth, and in this processing room 8, as shown in drawing 6 , it connected with the electrolytic device 4 as circulating-pump [of the reservoir water cycle passage 2] P, and a water quality maintenance means, and the residual chlorine concentration meter 6 as a water-examination means electrically, and it is equipped with the control section 9 which operates circulating-pump P and an electrolytic device 4 based on this residual chlorine concentration meter's 6 detection result. In addition, in this example, this control section 9 is arranged in said electrolytic device 4 and residual chlorine concentration meter 6, and the function part unit U which contained the private electric generator etc. further.
[0070] Moreover, the control section 9 has timer ability, as described above, based on the residual chlorine concentration meter's 6 detection result, circulating-pump P is operated with an electrolytic device 4, and also he is trying to make circulating-pump P always drive intermittently for every time amount set up beforehand.
[0071] That is, since the purpose which prevents bad hydration will be attained if reservoir water can prevent stagnation, even if it does not make it always circulate, intermittent operation is enough, power consumption is reduced and reduction of a running cost is aimed at.
[0072] While driving circulating-pump P, a control section 9 While carrying out Kaisei of the closing motion valves 15 and 16 prepared in the start edge [of the reservoir water cycle passage 2], and termination side, the closing motion valve 22 further prepared in the halfway of this passage 2, and the closing motion valve 32 of the branching passage 3 He adjusts the opening of the 1st flow control valve 31 and the 2nd flow control valve 51, and is trying to make it shunt toward the branching passage 3 and the branching passage 5 for water examinations by the predetermined flow rate.
[0073] At this example, it is per minute 200-400 cc in 10l./m and the branching passage 5 for water examinations to the branching passage 3. He is trying for amount of water to flow. The flowmeter with which 24 measure the flow rate in the reservoir water cycle passage 2, and 34 are flowmeters which measure the flow rate in the branching passage 3 among drawing 6 .
[0074] The maintenance of the water quality of giving the disinfection force to the tap water which this is made flowing back to a flush tank 10 by a control section's 9 electrolyzing the chlorine compound which drives an electrolytic device 4 and is contained in tap water, and generating a hypochlorous acid (HClO) and a hypochlorite (ClO^-), and is stored by the above configuration when the value detected with the residual chlorine concentration meter 6 is lower than 0.1 ppm can be performed automatically.
[0075] Therefore, when natural disasters, such as an earthquake, occur, in the park 7 which is this urgent blame place, precious domestic water can be immediately supplied to a disaster victim.
[0076] Moreover, since labor costs are reducible with automation, the cost of the water quality maintenance over a long period of time can be reduced.
[0077] Among drawing 5 and drawing 6 , 13 are gas drainage tubing formed successively to the flush tank 10, and in order to try to emit gas collected on the tank upper part, such as hydrogen and oxygen, to atmospheric air and to prevent the contamination from the outside, they have prepared the high efficiency particulate air filter. 14 is tap

water input port and is equipped with the lid. 17 is a drain, for example, when newly replacing reservoir water annually, it is enabling wastewater of reservoir water from the flush tank 10. 18 is a hydrant and the hydrant [81] for temporary construction which the entrance into the processing room 8 and 91 can carry out on the ground, and connects with said hydrant 18 through the extended hose 92, and water supply in the ground is enabled.
[0078] The example of a change of the above-mentioned emergency watersupply system C is shown in drawing 7 .
[0079] Between the reservoir water cycle passage 2 and the branching passage 3, this is what connected the branching passage R for water reducing to juxtaposition, and is arranging the closing motion valve R1, the flow control section R2, the flowmeter R3, and the check valve R4 in the branching passage R for the said water reducing from the upstream. Moreover, in this example, the closing motion valve 19 is further formed in the direct downstream of circulating-pump P of the reservoir water cycle passage 2.
[0080] The above-mentioned branching passage R for water reducing is suitably established in the branching passage 5 for water examinations, in order to pass by the optimal flow rate, and it may be established in it two or more steps not only in 1 passage. That is, it is set up so that the optimal amount of water introduced into the water-examination means of residual chlorine concentration meter 6 grade can be obtained reasonable.
[0081] In addition, although each example described above explained the flow control section as flow control valves 31 and 51 and R2 As shown not only in this valve structure but in drawing 8 , the path d of the piping itself which forms passage, such as the branching passage 3, and the branching passage 5 for water examinations or the above mentioned branching passage R for water reducing, can also be made into a flow control means by extracting gradually one by one to the path D of the reservoir water cycle passage 2.
[0082] As mentioned above, although this invention was explained through each example, this invention is not limited to each above-mentioned example, and the storage-of-water sections may be organ baths, such as a pool, and a cooling tower or a 24-hour bath system, for example, it can apply also to these water quality maintenance, and a selection setup is possible also for a water quality maintenance means or a water-examination means suitably according to the example of application.
[0083]
[Effect of the Invention] This invention is carried out with a gestalt which has been explained above, and does the following effectiveness so.
[0084] ** Constitute the reservoir water of storage-of-water circles from this invention according to claim 1 possible [circulation] through the reservoir water cycle passage in which the circulating pump was formed. While connecting to said storage-of-water section the branching passage for water examinations which extracted the flow rate to this reservoir water cycle passage through the flow control section possible [reflux] While circulating the reservoir water of the storage-of-water circles only in only driving a circulating pump by having formed the water-examination means in the branching passage for the said water examinations and preventing bad hydration as much as possible Water quality can be correctly supervised with a water-examination means to coincidence, and if water quality is less than a reference value, maintenance of water quality can be aimed at by taking a measure for a water quality improvement.
[0085] ** The reservoir water cycle passage which carried out free passage connection of flood opening and suicide-by-drowning opening of the storage-of-water section through the circulating pump in this invention according to claim 2, While connecting with juxtaposition in this reservoir water cycle passage, making reflux possible and extracting a flow rate rather than said reservoir water cycle passage through the 1st flow control section It considered as the configuration possessing the branching passage which interposed the water quality maintenance means in halfway, and the branching passage for water examinations which interposed the water-examination means in halfway while making it branch from this branching passage, making reflux possible at said storage-of-water section and extracting a flow rate rather than said branching passage through the 2nd flow control section. Therefore, since the optimal amount of water for detection of residual chlorine concentration can be led to a concentration meter, becoming detectable [residual chlorine concentration] and circulating reservoir water only with a circulating pump without arranging a storage pump etc. separately other than a circulating pump, the water supply system of domestic water can be built by low cost, for example, and the good condition can be maintained for domestic water over a long period of time. Moreover, since the arrangement location of a water-examination means can be set up freely, it becomes advantageous on a layout.
[0086] ** In this invention according to claim 3, the arrangement location of a water-examination means can be freely set up by having connected said branching passage for water examinations to juxtaposition in said branching passage.
[0087] ** In this invention according to claim 4, if the water after inspection termination can be returned to the storage-of-water section by natural fall, for example, a water-examination means is used as a residual chlorine concentration meter by having arranged the water-examination means above the storage-of-water section while carrying out free passage connection of the termination of said branching passage for water examinations at the storage-of-water section, a commercial thing can be used.
[0088] ** In this invention according to claim 5, by having connected with said circulating pump, the water quality maintenance means, and the water-examination means electrically, and having considered as the configuration possessing the control section which operates a circulating pump and a water quality maintenance means based on the detection result of this water-examination means, in addition to the effectiveness of the above-mentioned ** and **, the water quality maintenance over a long period of time can be automated, human cost is reduced, and laborsaving can be attained.

[0089] ** In addition to the effectiveness of the above-mentioned ** - **, the power saving effectiveness can be acquired by having controlled by this invention according to claim 6 to carry out intermittent operation of said circulating pump.

[0090] ** In addition to the effectiveness of the above-mentioned ** - **, in this invention according to claim 6, it becomes the the best for construction of the water supply gardenia fruit stem which supplies domestic water by having considered as the electrolytic device which electrolyzes water for said water quality maintenance means, and is made to generate a hypochlorous acid and a hypochlorite, and having used the water-examination means as the residual chlorine concentration meter.

[Translation done.]

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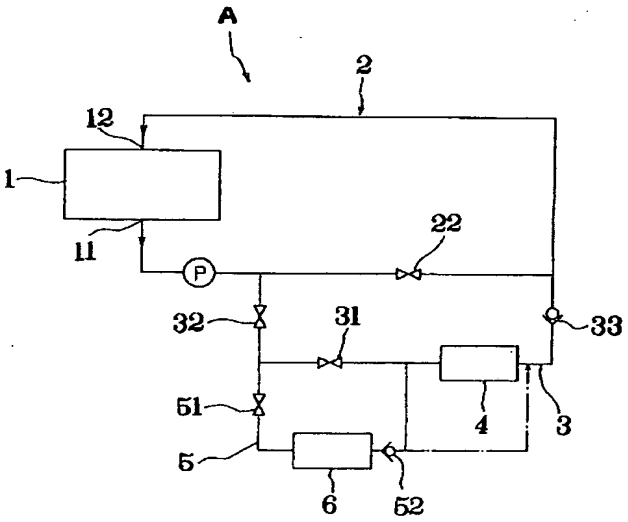
(54)【発明の名称】　水質維持装置

(57)【要約】
【課題】長期にわたり、低コストで水質維持を図ること。
【解決手段】貯水部(1) 内の貯留水を、循環ポンプ(P)を設けた貯留水循環流路(2) を介して循環可能に構成し、同貯留水循環流路(2) に、流量調整部(51)を介して流量を絞った水質検査用分岐流路(5) を前記貯水部(1)に還流可能に接続するとともに、同水質検査用分岐流路(5) に水質検査手段(6) を設けた。



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【特許請求の範囲】

【請求項１】貯水部(1),(10)内の貯留水を、循環ポンプ(P)を設けた貯留水循環流路(2)を介して循環可能に構成し、同貯留水循環流路(2)に、流量調整部(51)を介して流量を絞った水質検査用分岐流路(5)を前記貯水部(1),(10)に還流可能に接続するとともに、同水質検査用分岐流路(5)に水質検査手段(6)を設けたことを特徴とする水質維持装置。

【請求項２】貯水部(1),(10)の出水口(11)と入水口(12)とを、循環ポンプ(P)を介して連通連結した貯留水循環流路(2)と、

同貯留水循環流路(2)に並列に接続して還流可能とし、第１の流量調整部(31)を介して前記貯留水循環流路(2)よりも流量を絞るとともに、中途に水質維持手段(4)を介設した分岐流路(3)と、

同分岐流路(3)から分岐させて前記貯水部(1),(10)に還流可能とし、第２の流量調整部(51)を介して前記分岐流路(3)よりも流量を絞るとともに、中途に水質検査手段(6)を介設した水質検査用分岐流路(5)と、を具備することを特徴とする水質維持装置。

【請求項３】前記水質検査用分岐流路(5)を、前記分岐流路(3)に並列に接続したことを特徴とする請求項２記載の水質維持装置。

【請求項４】前記水質検査用分岐流路(5)の終端(50)を、貯水部(1),(10)に連通連結するとともに、水質検査手段(6)を貯水部(1),(10)の上方に配置したことを特徴とする請求項２記載の水質維持装置。

【請求項５】前記循環ポンプ(P)、水質維持手段(4)、及び、水質検査手段(6)に電気的に接続し、同水質検査手段(6)の検出結果に基づき、循環ポンプ(P)及び水質維持手段(4)を作動させる制御部(9)を具備することを特徴とする請求項２～４のいずれかに記載の水質維持装置。

【請求項６】前記循環ポンプ(P)を間歇運転させるように制御したことを特徴とする請求項１～５のいずれかに記載の水質維持装置。

【請求項７】前記水質維持手段(4)を、水を電気分解して次亜塩素酸や次亜塩素酸イオンを発生させる電解装置とし、かつ、水質検査手段(6)を残留塩素濃度計としたことを特徴とする請求項２～６のいずれかに記載の水質維持装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、水質維持装置に関し、詳しくは、タンク等に貯留した生活用水、プールの水、クーリングタワー内の水、あるいは24時間風呂の水等の水質を良好状態に維持可能とした水質維持装置に関するものである。

【０００２】

【従来の技術】例えば、タンク等に一旦貯留した生活用

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水の使用に際しては、従来、残留塩素濃度を監視して、その値が所定値を下回った場合、例えば0.1ppm以下になると塩素を消毒薬として投入して消毒力を付与するようにしていた。また、プールなどにおいても、消毒薬として塩素が用いられている。

【０００３】残留塩素濃度を検出するためには残留塩素濃度計が用いられているが、同濃度計に通す対象水は、通常、前記タンクやプールから所定時間毎に揚水ポンプでポンプアップして得ており、濃度検出後は系外に排水していた。

【０００４】

【発明が解決しようとする課題】ところが、上記したように単に貯水しているだけでは滞留水となって悪水となりやすいので、良水の状態を可及的に保つために、循環ポンプを配設して水を循環させることが考えられる。

【０００５】他方、上記残留塩素濃度計は、流量が多すぎたり流速が速すぎたりすると、濃度検出用の膜体が破損したりして故障の原因となるので、循環流路中には直接配設することができず、結局は揚水ポンプを設け、濃度検出用の水をポンプアップしていた。

【０００６】しかし、これでは揚水ポンプと循環ポンプとの二つのポンプが必要となり、コスト的に不利となってしまう。

【０００７】しかも、消毒力が低下した場合の消毒薬を投入する作業が煩わしい上、かかる消毒薬のコストの問題や、消毒不足、あるいは消毒過多により発生する二次災害が懸念される。

【０００８】このように、長期に貯留した水の水質を低コストで良好に維持することは難しく、特にこれが飲料することもあり得る生活用水であればなおさらであった。

【０００９】本発明は、上記課題を解決することのできる水質維持装置を提供することを目的としている。

【００１０】

【発明が解決するための手段】上記課題を解決するために、請求項１に記載の本発明では、貯水部内の貯留水を、循環ポンプを設けた貯留水循環流路を介して循環可能に構成し、同貯留水循環流路に、流量調整部を介して流量を絞った水質検査用分岐流路を前記貯水部に還流可能に接続するとともに、同水質検査用分岐流路に水質検査手段を設けた。

【００１１】また、請求項２記載の本発明では、貯水部の出水口と入水口とを、循環ポンプを介して連通連結した貯留水循環流路と、同貯留水循環流路に並列に接続して還流可能とし、第１の流量調整部を介して前記貯留水循環流路よりも流量を絞るとともに、中途に水質維持手段を介設した分岐流路と、同分岐流路から分岐させて前記貯水部に還流可能とし、第２の流量調整部を介して前記分岐流路よりも流量を絞るとともに、中途に水質検査手段を介設した水質検査用分岐流路と、を具備する構成

とした。

【００１２】また、請求項３記載の本発明では、前記水質検査用分岐流路を、前記分岐流路に並列に接続した。

【００１３】また、請求項４記載の本発明では、前記水質検査用分岐流路の終端を、貯水部に連通連結するとともに、水質検査手段を貯水部の上方に配置した。

【００１４】また、請求項５記載の本発明では、前記循環ポンプ、水質維持手段、及び、水質検査手段に電気的に接続し、同水質検査手段の検出結果に基づき、循環ポンプ及び水質維持手段を作動させる制御部を具備する構成とした。

【００１５】また、請求項６記載の本発明では、前記循環ポンプを間歇運転させるように制御した。

【００１６】また、請求項７記載の本発明では、前記水質維持手段を、水を電気分解して次亜塩素酸や次亜塩素酸イオンを発生させる電解装置とし、かつ、水質検査手段を残留塩素濃度計とした。

【００１７】

【発明の実施の形態】本発明は、貯水部内の貯留水を、循環ポンプを設けた貯留水循環流路を介して循環可能に構成し、同貯留水循環流路に、流量調整部を介して流量を絞った水質検査用分岐流路を前記貯水部に還流可能に接続するとともに、同水質検査用分岐流路に水質検査手段を設けたものである。

【００１８】水質検査手段としては、水の消毒力の有無を塩素濃度で検出することのできる残留塩素濃度計が好適に用いられる。また、流量調整部としては流量調整弁を好適に用いることができる。

【００１９】すなわち、生活用水やプールの水、クーリングタワーの水、24時間風呂の浴槽水等の貯留水を、循環流路で循環させて悪水化することを防止しつつ、水質検査手段が機能するに適正な流量を得て、正確に水質の検査を行うようにしている。

【００２０】このようにして、貯水部内の貯留水を循環させて悪水化を可及的に防止するとともに、同時に水質検査手段により水質を正確に監視して、水質が基準値を下回ると水質改善のための処置を施して水質の維持を図るものである。

【００２１】なお、水質維持手段としては、電解装置、オゾン発生装置、紫外線殺菌装置等が考えられ、これらも系内に備えておくことが好ましく、例えば、以下の構成が考えられる。

【００２２】すなわち、貯水部の出水口と入水口とを、中途に循環ポンプを設けた貯留水循環流路を介して連通連結し、同貯留水循環流路に、第１の流量調整部を介して前記貯留水循環流路よりも流量を絞るとともに、中途に水質維持手段を介設した分岐流路を並列に接続して還流可能とし、さらに、同分岐流路から、第２の流量調整部を介して前記分岐流路よりも流量を絞るとともに、中途に水質検査手段を介設した水質検査用分岐流路を分岐させて前記貯水部に還流可能とするものである。

【００２３】水質検査手段を介設した前記水質検査用分岐流路は、前記分岐流路に並列に接続したり、同水質検査用分岐流路の終端を、貯水部に連通連結するとともに、水質検査手段を貯水部の上方に配置する構成とすることができる。

【００２４】いずれの構成であっても、水質検査手段により水質の低下を示す値が検出されると、貯留水を循環させながら水質維持手段によって水の良化を図ることができる。

【００２５】さらに、前記循環ポンプ、水質維持手段、及び、水質検査手段に電気的に接続し、同水質検査手段の検出結果に基づき、循環ポンプ及び水質維持手段を作動させる制御部を具備することが好ましい。

【００２６】かかる制御部を備えることにより、水質の検査及び維持のための動作を自動的に、かつ、継続的に行うことができる。

【００２７】また、前記循環ポンプは、常時運転させることなく間歇運転させても水質の検査及び水質維持には十分であり、かつ、省電効果を奏する。

【００２８】さらに、前記水質維持手段を、水を電気分解して次亜塩素酸や次亜塩素酸イオンを発生させる電解装置とし、かつ、水質検査手段を残留塩素濃度計とすると、貯水部の水が水道水を貯留した生活用水である場合に特に有効となる。

【００２９】すなわち、生活用水である水道水をタンク内に貯留しておき、これを常時、あるいは間歇的に循環させて水質の悪化を防止しつつ、一定時間毎に残留塩素濃度を測定して、これが生活用水として不適当な濃度に下がると電解装置を作動させて、貯留水内に含まれる塩化物を電気分解し、殺菌作用を示す次亜塩素酸（ＨＣｌＯ）や次亜塩素酸イオン（ClO^-）を発生させ、これを貯留水中に還流させて貯留水に消毒力を付与し、生活用水として適当な状態を長期にわたり保持するものである。

【００３０】このように、生活用水を長期にわたり貯留可能とすれば、貯水部を例えば緊急避難所近辺に設置、あるいは、地中に埋設しておくことにより、地震等の災害の緊急時に備えることができる。

【００３１】なお、残留塩素濃度計としては、膜状電極を具備した一般に用いられる周知の濃度計でよく、かかる濃度計は、単位水量中の次亜塩素酸や次亜塩素酸イオンを測定する必要があるため、膜状電極を、滞留した水に浸漬するか、あるいは少量の緩やかな水流中に浸漬して計測する構成となっており、計測対象となる水の量が多く、流れが早い場合は正確な濃度検出ができないばかりか計器の故障の原因となるが、本発明では、上記したように適正な流量を得ることのできる分岐流路に設けているので、そのような不具合を生じることなく、正確に測定することが可能であり、また、測定を終えた水は、

貯水部に戻すことができる。

【００３２】そのために、かかる周知の残留塩素濃度計は前述したように貯水部の上方に配設する構成とするとよく、検査を終えた水は自然落下で貯水部に戻すことができる。

【００３３】また、残留塩素濃度計を、例えば以下の構成のものととすると、前記水質検査用分岐流路を前記分岐流路に並列に接続して貯水部へ還流可能とした構成のものであっても適用可能となる。したがって、残留塩素濃度計の設置個所を自由に設定することができ、生活用水を供給する給水システム等の構築に都合がよい。

【００３４】かかる残留塩素濃度計の構成とは、水質検査用分岐流路の中途に接続可能なストレートな管体で対象水流路を形成するとともに、同対象水流路の中途から上方へ分岐させて電極収容部を連設し、全体で略Ｔ字をなすように濃度計ケーシングを構成し、前記電極収容部に収容した膜状電極を対象水流路に臨ませて小流量に絞られた対象水と接触可能としたものである。

【００３５】ところで、貯留水循環流路と分岐流路との間に、水質検査用分岐流路へ最適の流量で流すための減水用分岐流路をさらに並列に接続することもできる。同減水用分岐流路は、１流路に限らず複数段設けても構わない。すなわち、水質検査手段に導入する最適な水量を無理なく得ることができるように設定されるものである。

【００３６】また、流量調整手段としては、適宜流量を調整することのできる前記の流量調整弁を用いることが好ましいが、分岐流路や水質検査用分岐流路、あるいは前記した減水用分岐流路等の流路を形成する配管自体の径を絞って流量調整手段とすることもできる。

【００３７】以上説明してきたように、本発明では、循環ポンプＰのみで貯留水を循環させながら、かつ、残留塩素濃度の検出に最適な水量を濃度計に導くことができるので、低コストでありながら、正確な濃度検出を行い、その検出結果に基づいて水質維持手段を作動させて水を長期にわたり良好な状態で貯留することができる。

【００３８】

【実施例】

（第１実施例）以下、添付図に基づいて、本発明の第１実施例を説明する。本実施例では、水質維持装置を生活用水を供給する給水システムＡとして説明する。

【００３９】図１は給水システムＡの模式的説明図である。

【００４０】１は貯水部としてのタンクであり、水道水を生活用水として貯留している。

【００４１】２は貯留水循環流路であり、タンク１の出水口11と入水口12とを、循環ポンプＰを介して連通連結しており、タンク１内の水道水を循環可能としている。22は同貯留水循環流路２に介設した開閉弁である。

【００４２】３は分岐流路であり、貯留水循環流路２に並列に接続するとともに、第１の流量調整部としての第１流量調整弁31を介して前記貯留水循環流路２よりも流量を絞っている。そして、中途に水質維持手段としての電解装置４を介設し、同電解装置４を通過した水を前記貯留水循環流路２に還流可能としている。

【００４３】すなわち、分岐流路３は、貯留水循環流路２の循環ポンプＰの下流側から分岐し、第１流量調整弁31を介して電解装置４と連通連結し、同電解装置４の下流側に設けた逆止弁33を介して貯留水循環流路２に合流している。32は前記第１流量調整弁31の上流側に設けた開閉弁である。

【００４４】５は水質検査用分岐流路であり、分岐流路３に並列に接続するとともに、第２の流量調整部としての第２流量調整弁51を介して前記分岐流路３よりもさらに流量を絞り、中途に水質検査手段として、後述する構成からなる残留塩素濃度計６を介設している。52は残留塩素濃度計６の下流側に設けた逆止弁である。

【００４５】すなわち、水質検査用分岐流路５は、分岐流路３の第１流量調整弁31と開閉弁32の間から分岐して、第２流量調整弁51を介して残留塩素濃度計６と連通連結し、同残留塩素濃度計６から、さらに中途に逆止弁52を介して前記電解装置４の上流側に合流している。なお、同水質検査用分岐流路５の終端は、図１の一点鎖線で示すように、電解装置４の下流側に合流させてもよい。

【００４６】本実施例に係る残留塩素濃度計６の構成は以下の通りである。

【００４７】図２に示すように、水質検査用分岐流路５の中途に接続可能なストレートな接続管体で対象水流路61を形成するとともに、同対象水流路61の中途から上方へ分岐させて管状の電極収容部62を連設し、全体で略Ｔ字をなすように濃度計ケーシング60を構成し、前記電極収容部62に収容した膜状のセンサ電極63を対象水流路61に臨ませて小流量に絞られた対象水と接触可能としたものである。図２中、64はパッキン、65は濃度計制御部、66は同濃度計制御部65と前記センサ電極63とを接続する信号線である。

【００４８】残留塩素濃度計６をかかる構成としたことにより、一つの循環ポンプＰによりタンク１内の水道水を貯留水循環流路２で循環させて水の滞留を防止し、悪水化を防止しながら、適宜、分岐流路３の開閉弁32を開き、同分岐流路３の第１流量調整弁31と、水質検査用分岐流路５の第２流量調整弁51とを駆動して貯留水循環流路２よりも少量とした水道水を分岐流路３に分流させるとともに、なおさらに流量を絞って少量とした水道水を水質検査用分岐流路５に分流させる流量調整を行うことができ、残留塩素濃度を正確に計測することができる。

【００４９】このように、本実施例では、残留塩素濃度計６に見合った適量の水道水を一つの循環経路の中で得ることができ、正確な残留塩素濃度を計測することで、

その結果に基づいて電解装置４を作動させて水質の維持を図ることができる。

【００５０】すなわち、残留塩素濃度計６で検出した値が、例えば0.1ppmよりも低い場合は水道水の消毒力が不足して生活用水としては不適当と判断されるので、電解装置４を駆動して水道水に含有される塩素化合物を電解し、次亜塩素酸（ＨＣｌＯ）や次亜塩素酸イオン（ＣｌＯ⁻）を発生させて、これを貯留水循環流路２を介してタンク１内に還流させ、水道水に消毒力を付与するものである。なお、かかる電解作用は、残留塩素濃度が例えば0.15ppm 以上の値をとるまで継続するものとする。

【００５１】また、循環ポンプＰの他に、別途揚水ポンプ等を配設することなく残留塩素濃度の検出が可能となり、循環ポンプＰのみで貯留水を循環させながら、かつ、残留塩素濃度の検出に最適な水量を濃度計に導くことができるので、低コストで生活用水の給水システムＡを構築することができ、生活用水を長期にわたり、その良好な状態を維持することができる。

【００５２】またさらに、本実施例においては、残留塩素濃度計６の配設位置を自由に設定することができるので、給水システムＡを構築する場合などに適する。

【００５３】（第２実施例）次に、図３を参照しながら本発明の第２実施例を説明する。ここでも、水質維持装置を給水システムＢとして説明する。

【００５４】図３は第２実施例に係る給水システムＢの模式的説明図である。

【００５５】本実施例で先の実施例と異なるのは、前記水質検査用分岐流路５の終端50を、タンク１に連通連結するとともに、水質検査手段となる残留塩素濃度計6'を、タンク１の上方に配置したことにある。

【００５６】ここでは、残留塩素濃度計6'を、従来より一般に用いられている周知の構成のものを用いている。

【００５７】かかる残留塩素濃度計6'は、図４に示すように、揚水ポンプP'と連通連結した流入路5'を底部に接続した貯留部6aと、同貯留部6aと小径の連通管67を介して連通連結した計測部6bとからなり、貯留部6aには、下端に排水口68a を形成したオーバーフロ管68を設け、同オーバーフロー管68の中途と前記計測部6bとをさらに還流路69で連通連結している。6a'は大気開放用孔である。

【００５８】すなわち、計測対象水は、ポンプアップされて貯留部6aの下部から流入し、オーバーフロー管68から系外に自重で落下排出されるが、オーバーフロー管68上端間の小さなヘッドで一部が前記連通管67を介して流量を絞られ、かつ減速されて計測部6b内に流入し、同計測部6b内に充満しながらも漸次還流路69よりオーバーフロー管68に還流して排出されることになる。したがって、計測対象水の殆どはオーバーフロー管68から還流し、計測部6b内には極めて低速流で流入するので、計測対象水は略滞留した状態となる。

【００５９】計測部6b内には、残塩濃度計制御部65'に信号線66'を介して接続した膜状のセンサ電極63'を収納配設しており、同電極63'が計測対象水と接触することにより残留塩素濃度を計測可能としている。

【００６０】このように、一般の残留塩素濃度計6'は、計測対象水の水量が多く、流れが速い場合は正確な濃度検出ができないばかりか計器、特に膜状のセンサ電極63'の故障の原因となる。

【００６１】そこで、本実施例では、上記残留塩素濃度計6'をタンク１の上方に配置し、分岐流路３からさらに分岐させて、流量をさらに絞った水質検査用分岐流路５の中途に前記流入路5'の先端を連通連結させ、オーバーフロー管68の下端の排水口68をタンク１に臨ませるようにしている。すなわち、水質検査用分岐流路５の終端50を貯水部１に直接連通連結させた構成としている。

【００６２】したがって、従来の残留塩素濃度計6'を用いた本実施例においても、計測対象水の適正な流量・流速を得ることができ、残留塩素濃度計6'が故障したりする不具合を解消して正確な残留塩素濃度の測定が可能となった。しかも、測定を終えた水は、自然落下によりタンク１に戻すことができる。

【００６３】このように、本実施例に係る給水システムＢでは、残留塩素濃度計6'として市販のものを利用することができる利点を有する。また、残留塩素濃度計6'の下流側には、第１実施例のような逆止弁52を設ける必要もない。

【００６４】なお、他の構成は第１実施例と同様なのでここでの説明は省略する。

【００６５】（第３実施例）次に、図５～図７を参照しながら本発明の第３実施例を説明する。

【００６６】本実施例は、第１実施例で説明した給水システムＡを震災等の際における応急給水システムＣに適用したものであり、基本的な構成は第１実施例と略同じである。図５はかかる応急給水システムＣの説明図、図６は同模式図である。

【００６７】図５において、７は地方自治体等により緊急避難所に指定された公園であり、同公園７内に本実施例に係る応急給水システムＣを埋設している。そして、震災等によって水道が寸断された場合に、応急給水システムＣの貯水部となる貯水タンク10より、生活用水を被災者に応急的に供給可能としている。なお、本実施例では、貯水タンク10の容量を50立方メートルとし、貯留水循環流路２の流量を毎分200 リットルに設定している。

【００６８】また、貯水タンク10の出水口11及び入水口12は、貯水タンク10内の撹拌効果を高めるように、底部近傍に設けている（図６参照）。

【００６９】８は前記貯水タンク10に隣接して地中に設けた処理室であり、同処理室８内には、図６に示すように、貯留水循環流路２の循環ポンプＰ、水質維持手段としての電解装置４、及び、水質検査手段としての残留塩

素濃度計６に電気的に接続して、同残留塩素濃度計６の検出結果に基づき、循環ポンプＰ及び電解装置４を作動させる制御部９を備えている。なお、本実施例では、かかる制御部９を前記電解装置４や残留塩素濃度計６、さらには自家発電装置等を収納した機能部ユニットＵ内に配設している。

【００７０】また、制御部９はタイマ機能を有しており、上記したように残留塩素濃度計６の検出結果に基づき電解装置４とともに循環ポンプＰを作動させる他、予め設定された時間毎に、常時間欠的に循環ポンプＰを駆動させるようにしている。

【００７１】すなわち、貯留水は滞留を防止できれば悪水化を防ぐ目的は達成されるので、常時循環させなくとも間歇運転で十分であり、電力消費を低減させてランニングコストの低減を図っている。

【００７２】制御部９は、循環ポンプＰを駆動している間は、貯留水循環流路２の始端側及び終端側に設けた開閉弁15, 16 、さらに同流路２の中途に設けた開閉弁22と、分岐流路３の開閉弁32を開成するとともに、第１流量調整弁31と第２流量調整弁51の開度を調整し、所定の流量で分岐流路３及び水質検査用分岐流路５に分流させるようにしている。

【００７３】本実施例では、分岐流路３に毎分10リットル、水質検査用分岐流路５には毎分200 ～400cc の水量が流れるようにしている。図６中、24は貯留水循環流路２中の流量を計測する流量計、34は分岐流路３中の流量を計測する流量計である。

【００７４】以上の構成により、残留塩素濃度計６で検出した値が例えば0. 1ppmよりも低い場合は、制御部９は電解装置４を駆動して水道水に含有される塩素化合物を電解し、次亜塩素酸（ＨＣｌＯ）や次亜塩素酸イオン（ClO^-）を発生させてこれを貯水タンク10に還流させ、貯留している水道水に消毒力を付与するという水質の維持管理を自動的に行うことができる。

【００７５】したがって、地震などの天災が発生した場合に、この緊急非難所である公園７においては、被災者へ貴重な生活用水を即座に供給することができる。

【００７６】また、自動化により人件費が削減できるので、長期にわたる水質維持のコストを低減することができる。

【００７７】図５及び図６中、13は貯水タンク10に連設したガス抜き管であり、タンク上部に溜まった水素や酸素等のガスを大気へ放出するようにしており、また、外部からの汚染を防止するためにヘパフィルターを設けている。14は水道水投入口であり、蓋体を備えている。17はドレンであり、例えば一年毎に貯留水を新たに入替える場合に貯留水を貯水タンク10から排水可能としている。18は給水栓、81は処理室８内への出入口、91は地上へ持ち出し可能な仮設用給水栓であり、前記給水栓18に延長ホース92を介して接続し、地上での給水を可能としている。

【００７８】上記応急給水システムＣの変容例を図７に示す。

【００７９】これは、貯留水循環流路２と分岐流路３との間に、減水用分岐流路Ｒを並列に接続したもので、同減水用分岐流路Ｒには、上流側から開閉弁R1、流量調整部R2、流量計R3、逆止弁R4を配設している。また、この例では、貯留水循環流路２の循環ポンプＰの直下流側にさらに開閉弁19を設けている。

【００８０】上記減水用分岐流路Ｒは、水質検査用分岐流路５へ最適の流量で流すために適宜設けられるもので、１流路に限らず複数段設けても構わない。すなわち、残留塩素濃度計６等の水質検査手段に導入する最適な水量を無理なく得ることができるように設定されるものである。

【００８１】なお、上記してきた各実施例では、流量調整部を流量調整弁31, 51, R2として説明したが、かかる弁構造に限らず、例えば、図８に示すように、貯留水循環流路２の径Ｄに対して、分岐流路３や水質検査用分岐流路５、あるいは前記した減水用分岐流路Ｒ等の流路を形成する配管自体の径ｄを、順次段階的に絞ることで流量調整手段とすることもできる。

【００８２】以上、各実施例を通して本発明を説明したが、本発明は上記各実施例に限定されるものではなく、例えば、貯水部はプールやクーリングタワー、あるいは、24時間風呂等の浴槽であってもよく、これらの水質維持にも適用可能であり、適用例に応じて、水質維持手段や水質検査手段も適宜選択設定可能である。

【００８３】

【発明の効果】本発明は、以上説明してきたような形態で実施され、以下の効果を奏する。

【００８４】①請求項１記載の本発明では、貯水部内の貯留水を、循環ポンプを設けた貯留水循環流路を介して循環可能に構成し、同貯留水循環流路に、流量調整部を介して流量を絞った水質検査用分岐流路を前記貯水部に還流可能に接続するとともに、同水質検査用分岐流路に水質検査手段を設けたことにより、循環ポンプを駆動するだけで貯水部内の貯留水を循環させて悪水化を可及的に防止するとともに、同時に水質検査手段により水質を正確に監視することができ、水質が基準値を下回ると水質改善のための処置を施すことによって水質の維持を図ることができる。

【００８５】②請求項２記載の本発明では、貯水部の出水口と入水口とを、循環ポンプを介して連通連結した貯留水循環流路と、同貯留水循環流路に並列に接続して還流可能とし、第１の流量調整部を介して前記貯留水循環流路よりも流量を絞るとともに、中途に水質維持手段を介設した分岐流路と、同分岐流路から分岐させて前記貯水部に還流可能とし、第２の流量調整部を介して前記分岐流路よりも流量を絞るとともに、中途に水質検査手段

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を介設した水質検査用分岐流路と、を具備する構成とした。したがって、循環ポンプの他に、別途揚水ポンプ等を配設することなく残留塩素濃度の検出が可能となり、循環ポンプのみで貯留水を循環させながら、かつ、残留塩素濃度の検出に最適な水量を濃度計に導くことができるので、例えば生活用水の給水システムを低コストで構築することができ、生活用水を長期にわたり、その良好な状態を維持することができる。また、水質検査手段の配設位置を自由に設定することができるので、レイアウト上有利となる。

【００８６】③請求項３記載の本発明では、前記水質検査用分岐流路を、前記分岐流路に並列に接続したことにより、水質検査手段の配設位置を自由に設定することができる。

【００８７】④請求項４記載の本発明では、前記水質検査用分岐流路の終端を、貯水部に連通連結するとともに、水質検査手段を貯水部の上方に配置したことにより、検査終了後の水を貯水部に自然落下で戻すことができ、例えば水質検査手段を残留塩素濃度計とすると、市販のものを利用することができる。

【００８８】⑤請求項５記載の本発明では、前記循環ポンプ、水質維持手段、及び、水質検査手段に電気的に接続し、同水質検査手段の検出結果に基づき、循環ポンプ及び水質維持手段を作動させる制御部を具備する構成としたことにより、上記③、④の効果に加え、長期にわたる水質維持を自動化でき、人的コストを削減して省力化が図れる。

【００８９】⑥請求項６記載の本発明では、前記循環ポンプを間歇運転させるように制御したことにより、上記①～⑤の効果に加え、省電効果を得ることができる。

【００９０】⑦請求項６記載の本発明では、前記水質維持手段を、水を電気分解して次亜塩素酸や次亜塩素酸イ＊

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＊オンを発生させる電解装置とし、かつ、水質検査手段を残留塩素濃度計としたことにより、上記②～⑥の効果に加え、生活用水を供給する給水シシステムの構築に最適となる。

【図面の簡単な説明】

【図１】第１実施例に係る水質維持装置の模式的説明図である。

【図２】第１実施例に係る水質維持装置が具備する残留塩素濃度計の説明図である。

【図３】第２実施例に係る水質維持装置の模式的説明図である。

【図４】第２実施例に係る水質維持装置が具備する残留塩素濃度計の説明図である。

【図５】第３実施例に係る水質維持装置の説明図である。

【図６】同模式的説明図である。

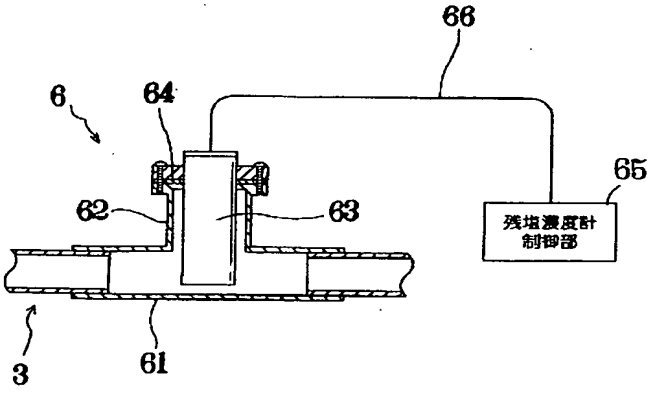
【図７】同変容例を示す模式的説明図である。

【図８】流量調整弁の他の実施例の説明図である。

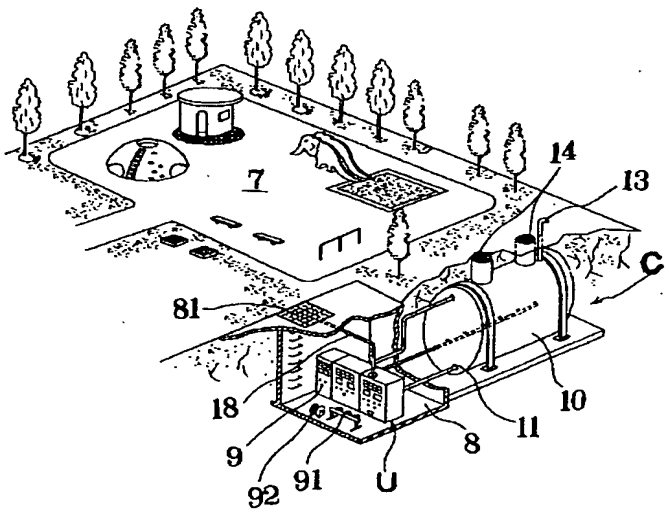
【符号の説明】

A　給水システム（水質維持装置）
P　循環ポンプ
1　タンク（貯水部）
2　貯留水循環流路
3　分岐流路
4　電解装置（水質維持装置）
5　水質検査用分岐流路
6　残留塩素濃度計（水質検査手段）
9　制御部
10　貯水タンク（貯水部）
31　第１流量調整弁（流量調整部）
32　開閉弁
51　第２流量調整弁（流量調整部）

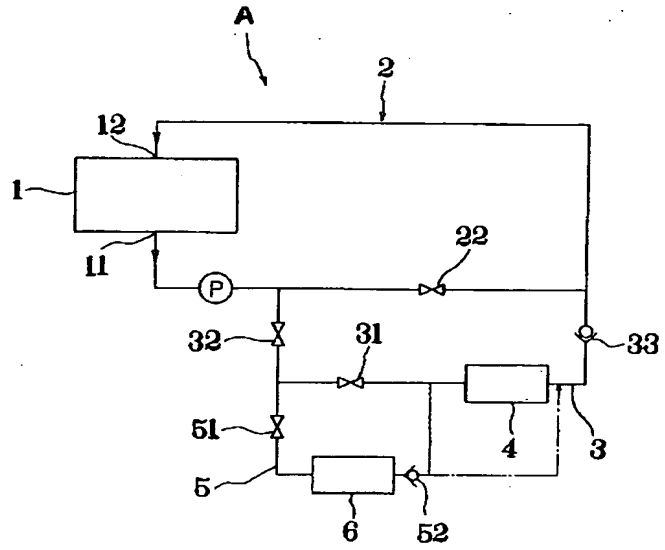
【図２】



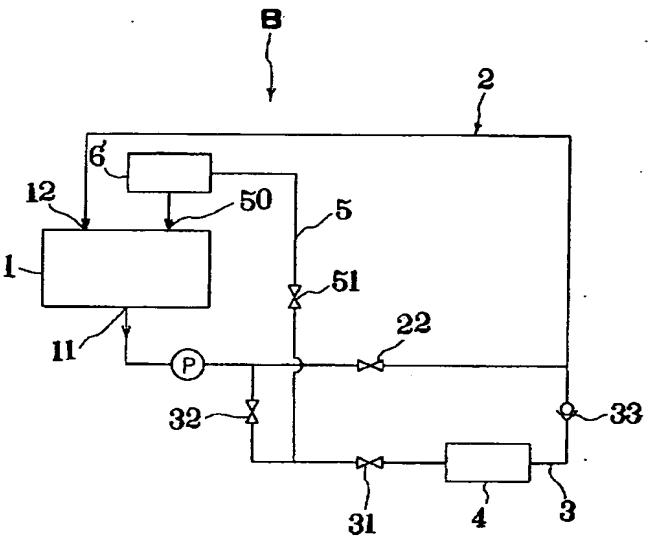
【図５】



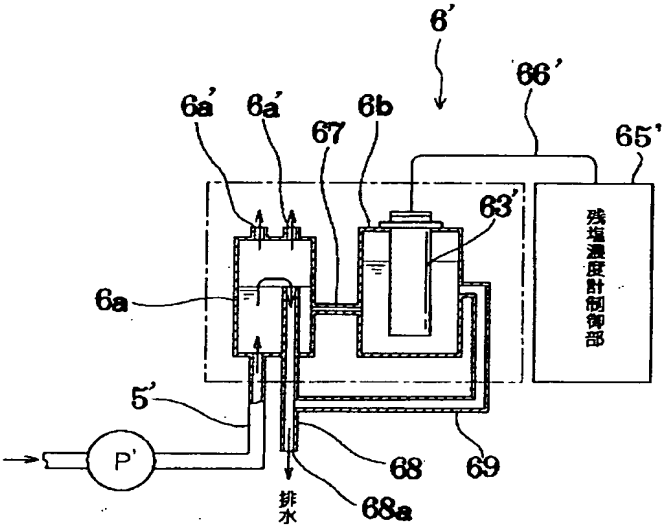
【図１】


A
2
12
1
11
P
22
32
31
33
51
4
3
5
6
52

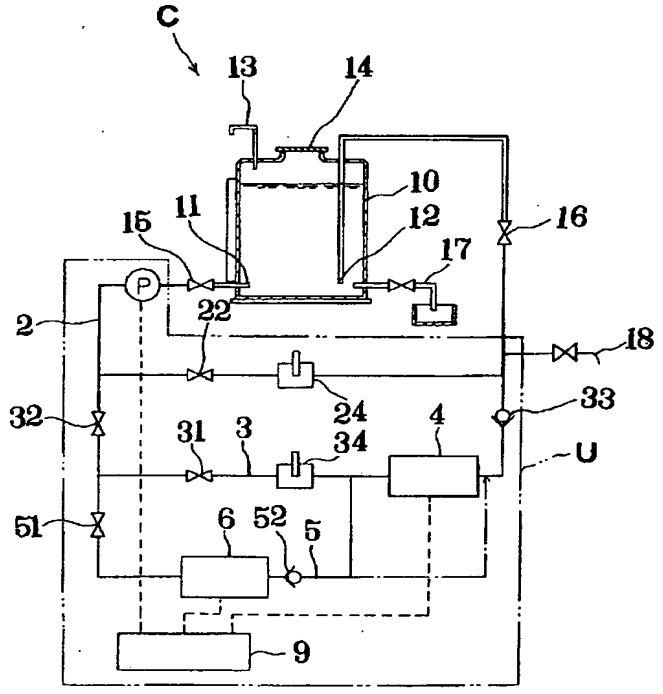
【図３】


B
2
6'
12
50
5
1
51
11
P
22
32
33
31
4
3

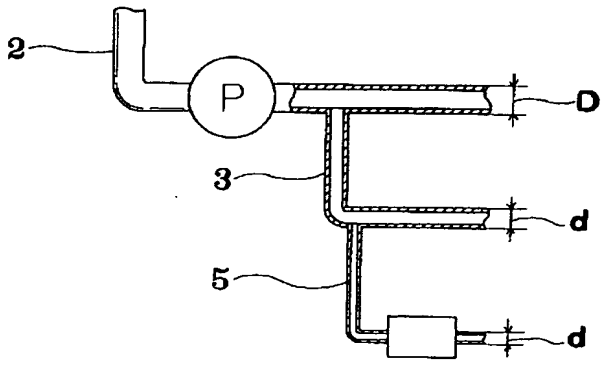
【図４】


6'
66'
6a'
6a'
6b
67
65'
63'
残塩濃度計制御部
6a
5'
P'
68
69
排水
68a

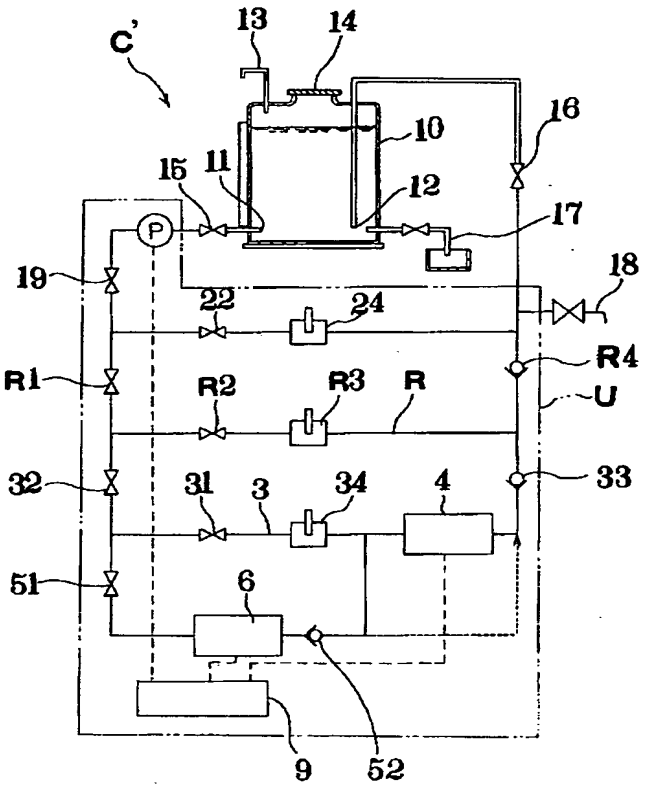
【図６】


C
13
14
10
11
12
15
16
17
P
22
2
18
24
32
31
3
34
4
33
U
51
6
52
5
9

【図８】


2
P
D
3
d
5
d

【図７】



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	５５０		５５０Ｄ
			５５０Ｌ
	５６０		５６０Ｆ

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